DOCUMENT RESUME

ED 119 692 95 IR 003 160

TITLE AECT Research Abstracts, 1976. Prepared for the Association for Educational Communications and Technology Annual Meeting (Anaheim, California, March 29 through April 2. 1976).
INSTITUTION Stanford Univ., Calif. ERIC Clearinghouse on Information Resources.
SPONS AGENCY National Inst. of Education (DHEW), Washington, D.C.
PUB DATE Mar 76
NOTE 45p.; Papers abstracted are available through ERIC

EDRS PRICE MF-$0.83 HC-$2.06 Plus Postage
DESCRIPTORS *Abstracts; Biology Instruction; Conference Reports; Educational Development; *Educational Technology; Evaluation Methods; Graduate Study; *Instructional Media; *Instructional Technology; *Media Research; Medical Education; Music Reading; Remedial Reading; Speeches; Visual Perception
IDENTIFIERS AECT 76; Visual Aptitude

ABSTRACT

Thirty-five research abstracts cover instructional technology in the following areas: (1) its application to elementary education, medical education, music reading skills, teacher education, college biology, and college student attitudes; (2) an evaluation of various university instructional technology graduate programs; and (3) its cost effectiveness. Additional abstracts deal with criteria for media evaluation, color cueing techniques in visual instructional material, and the development of instructional products in relation to higher education curriculum revision. Also reported are several learning studies testing the perceptual learning process and rate controlled speech. (NR)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED119692

AECT Research Abstracts, 1976

Prepared for the Annual Convention of

The Association for Educational Communications and Technology

Anaheim, California, March 29 through April 2, 1976

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

IR 003 160

The ERIC Clearinghouse on Information Resources
Stanford Center for Research and Development in Teaching
School of Education, Stanford University, Stanford, California 94305 (415) 497-3345

Specializing in Materials and Strategies for Learning

March 1976

ERIC AT STANFORD is pleased once more to be able to cooperate with the AECT Research Committee and Richard Clark in making available these abstracts for distribution at the AECT Annual Convention.

We hope that we can be of other service to you as well. If you are not familiar with **ERIC (EDUCATIONAL RESOURCES INFORMATION CENTER)**, please contact us.

The research abstracts are listed in the order in which the papers are to be presented.

Lewis B. Mayhew
MS.

Lewis B. Mayhew
Clearinghouse Director

RESEARCH ABSTRACTS
1976

1. Lynna Ausburn. "Visual Aptitude as a Learning Style."
2. Wayne Bruning. "Visual Aptitude and Achievement."
3. Floyd B. Ausburn. "Visual Aptitude as an Instructional Variable."
4. Jack Debes. "Visual Aptitude as Languaging Aptitude." (No abstract available).
5. Lida M. Cochran. "Selected Problems in Visual Aptitude–Treatment Interaction Studies."
6. Tillman J. Ragan. "Implications of Visual Learning Style and Visual Language Development Research in Educational Technology."
7. Elizabeth G. Cohen. "A Sociologist's View of Instructional Technology Research."
8. Robert G. George. "A Review of Research on Rate-Controlled Speech and Its Implications for Education."
9. Abdul Sajid, Micahel Feinzimer, and James Magero. "Instructional Effectiveness of Simulation Technology in Medical Education."
10. Michael R. Simonson. "Videotaped Commitment: Influence on Subsequent Student Attitude and Achievement."
11. Michael Szabo, Dorothy Alfke, Robert L. Shrigley, and Paul W. Welliver. "Technology and Psychology: Effects of Modelling Upon Verbal Behaviors Through Broadcast ITV."
12. Muriel J. Bebeau. "The Effects of Auditory Cues and Auditory and Visual Cues on Reading of Musical Rhythms."
13. J. Steven Soulier. "A Description of a Conceptual Model of Institutional Renewal."
14. J. Nicholls Eastmond, Jr. "Five Years of Instructional Development: Description of the Evaluation Process."
15. Michael DeBloois. "A Report of the Finding of an Evaluation of an Instructional Development Center."
16. William Winn. "Factor Analysis: A Tool for Instructional Technology Research."
17. Ken Burke. "A Functional/Experiential Approach to Criticism of Multimedia Programs."
18. Dean R. Spitzer. "A Delphic Exploration of the Future of Educational Media."
19. Billie Grace Herring. "A Study of Selected Factors Affecting Media-Related Competencies for Teachers, 1974-2000 A.D."
20. Lynna J. Ausburn, Kathryn T. Back, and Barbara Hoover. "A Comparison of Remedial and Non-Remedial Readers on Selected Perceptual Style Variables."
21. Susan Ruotsala Storm. "Preference for Visual, Aural, or Audio-Visual Treatments in Ten Educational Settings as a Variable in ATI Research."
22. Louis H. Berry. "Interactive Effects of Color Realism and Learner I.Q. on Visualized Instruction."

23. Keith A. Hall. "Graduate Education in Instructional Systems."

24. Richard Clark. "A Clinical Model for Graduate Education."

25. Thomas M. Schwen. "Curriculum Elements of Graduate Education: A Brief Case Study on the Evaluation of a Doctoral Program."

26. Robert D. Tennyson. "Alternative Forms and Functions of the Dissertation."

27. Harvey B. Black. "Instructional Science-Based Prescriptions for Preparing Instructional Scientists."

28. John W. Eads. "An Instructional Systems Approach for the Teaching of Undergraduate Biology at Kansas State University."

29. John W. LaTrielle. "The Design, Development, Implementation, and Evaluation of a College Level Introductory Biology Program for Majors and Non-Majors, Individualized for Student Rate, Method of Instruction and Student Goals."

30. Donald D. Rogers. "Blunders Commonly Found in Studies of the Cost of Instructional Technology."

31. Maryann Barron. "An Empirical Analysis of the Components of Behavioral Objectives." (No abstract available).

32. Dr. Shelly D. Freisinger. "The Effect of Cartoon-Embellished Programmed Textual Instruction on Students' Skill Learning and Affective Learning." (No abstract available).

33. Jerry D. Sparks. "The Role of Context in Recognition Memory for Pictorial Materials."

34. Alan D. Todd. "The Influence of Contextual Stimuli on Test Performance of College Students."

35. Thomas A. Arnold. "The Instructional Effects of Verbal/Visual Feedback in Visualized Instruction." (No abstract available).

Robert D. Tennyson. "Evaluation: Its Role in Instructional Development."

Abstract

VISUAL APTITUDE AS A LEARNING STYLE

Lynna J. Ausburn
Teaching Associate
College of Education
University of Oklahoma
820 Van Vleet Oval
Norman, Oklahoma 73069

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University

It is the contention of many of today's leading researchers in the field of instructional technology that media research should be related to contemporary psychological inquiry into cognition. It is the belief of these researchers that media utilization is concerned primarily with stimuli presentation and that media research should therefore be largely concerned with the impact of various manipulations of stimulus presentation on the psychological variables of cognition which govern learning.

One group of individual differences in cognition is collectively referred to as *cognitive styles*. These are psychological dimensions which represent stable individual differences in manners of acquiring and processing information. Several of these dimensions have been the subjects of intensive theoretical and empirical investigation. Five cognitive style dimensions are closely related to visual perception and visual aptitude in specific task situations. These represent individual learning styles when visual stimuli are utilized.

The five cognitive style dimensions of primary importance to visual aptitude as a learning style are:

1. Lowenfeld's visual/haptic dimension of perceptual types
2. Witkin's field independence/field dependence dimension of perceptual style
3. Kagan's reflectivity/impulsivity dimension of perceptual tempo
4. Santostefano's flexible/constricted control dimension of perception in the presence of visual distraction or contradiction
5. Santostefano's sharpening/leveling dimension of perception and assimilation into memory

It is the primary purpose of this presentation to:

1. define these five cognitive style dimensions,
2. illustrate the testing instruments used to assess them, and
3. relate them to Fletcher's theoretical model of cognitive processes in order to illustrate their influence on the learning process and the learner's generation of solutions to learning tasks.

Abstract

VISUAL APTITUDE AND ACHIEVEMENT

Wayne Bruning
Assistant Professor
School of Education
University of South Dakota
Vermillion, South Dakota 57069

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

Research conducted by Lowenfeld, Walter and Drews supports the idea that some students do possess characteristics which classify them as visual learners. The results of their work strongly suggest that over one-third of our population fits into a visual category and thus must be taught via visual techniques if they are to be successful learners in school. Since we live in a "visual world" and teachers are employing more visual techniques in their teaching methodology, one naturally wonders if these visually oriented students are more successful learners in the modern school environment.

In utilizing Lowenfeld's "visual-haptic" typology as a means of identifying visually oriented students, several research studies have attempted to answer the latter question. Erickson discovered that "the mean level of student achievement in beginning mechanical drawing is significantly affected by and is directly related to visual-haptic orientation of the student." In 1969, he found that non-visually oriented students were likely to be from one-half to one full grade level below their counter-parts, visually-oriented students, in reading achievement at the seventh grade level. In more recent research, Bruning reports that there does appear to be a significant relationship between visual aptitude and achievement in both reading and mathematics.

Visual literacy activities indicate that when students are taught via visual techniques, they show improvements in oral and written language facility and in reading ability. Additional results of such activities have a tendency to develop one's self-concept and environmental awareness. This would lead one to believe that visual learning styles may be developed in our schools.

Actually, we have just begun to scratch the surface as to what effect visual aptitudes and learning styles have on achievement in school. Preliminary research implies that it does have an effect. However, visual aptitude and learning styles need to be more clearly defined if we are going to be able to develop educational programs to meet the needs of all students.

Abstract 3

VISUAL APTITUDE AS AN INSTRUCTIONAL VARIABLE

Floyd B. Ausburn
Coordinator of Media Services
University of Oklahoma
College of Arts & Sciences
Education Building
820 Van Vleet Oval
Norman, Oklahoma 73069

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

If it is true that learners possess individual differences in visual aptitudes and learning styles (which depend, at least in part, on visual aptitudes), then it is also true that the design of instruction for a given learner should also depend, at least in part, on that learner's learning style. When researchers begin to discover the existing interactions among task presentation modes and individual differences in cognitive variables in specific learning task situations, to build them into an instructional design model, and to develop theories of instructional strategies, we can perhaps begin to develop a true science of instruction.

In analyzing which instructional strategies and presentation modes are best for any given learner, this researcher advocates a three-dimensional model which examines the relationships among three specific variables:

1. the psychological requirements of a given learning task,
2. individual differences in learning style, and
3. characteristics of a given instructional mode.

This model can be viewed as a three-dimensional cube in which presentation modes, task requirements, and learner differences interact. The uniting tie is the psychological function which underlies a given learning task and which is accomplished by a given mode of presentation.

The primary purposes of this presentation are:

1. present this three-dimensional interactive model,
2. present the concept of *supplantation* of psychological task requirements which are difficult for some learners by appropriate instructional techniques, and
3. present illustrations of research which employ the three-dimensional model.

It is believed by this researcher that the model suggests a system of research which is interactive in nature and which might ultimately lead to a prescriptive body of theory in instructional design. By identifying specific interactions of learning style, psychological task requirements, and supplantation capabilities of instructional modes, it may be possible to develop a body of theory which would allow the accurate prediction of performance on a given learning task by a learner with given learning style characteristics and a given mode of task presentation.

Abstract 5

SELECTED PROBLEMS IN VISUAL APTITUDE-TREATMENT INTERACTION STUDIES

Lida M. Cochran
Assistant Professor
W-15 East Hall
Educational Media
The University of Iowa
Iowa City, Iowa 52242

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

This paper uses a metaphoric mode to describe some of the problems resulting from the exclusive reliance on traditional controlled experiments to research human learning. The complexities of individual aptitudes are illustrated and examples are given of the problems of adequately categorizing students according to their differences.

In the treatment dimension, questions are raised regarding problems of whether the intended instruction is the actual instruction perceived by the learners in the classroom. Brief attention is given to testing and measurement instruments used in determining the effectiveness of the treatment. Major emphasis is directed to the problems resulting from placing visual and verbal learning materials in competitive roles to teach the same objectives. It is proposed that visual and verbal modes be considered as complementary rather than competitive. This approach forces attention to the requirements of the learning task and to the need for examination of the precise requirements of the stimulus materials.

Examples of research in psychology, anthropology and neurophysiology are cited to demonstrate the need for interdisciplinary teams to research the role of visuals in learning and thinking.

Members of AECT are reminded that their convention theme in 1965 challenged them to be "agents and objects of change." The need for alternate approaches to research in instruction and learning is described and suggestions made as to avenues which may lead to discoveries which are educationally significant.

IMPLICATIONS OF VISUAL LEARNING STYLE AND VISUAL LANGUAGE DEVELOPMENT RESEARCH IN EDUCATIONAL TECHNOLOGY

Tillman J. Ragan, Symposium Moderator
Associate Professor
820 Van Vleet Oval
College of Education
The University of Oklahoma
Norman, Oklahoma 73069

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

Visual aptitude has been viewed in this symposium from two standpoints. The first represents a view of visual aptitude as a point of departure for instructional design. As such, knowledge about learner's visual aptitude or perceptual style (as in Lowenfeld's "visual-haptic" typology) is seen as having ultimate utility in assisting decision-making processes on instructional treatment characteristics. The other standpoint views visual aptitude as a dimension of languaging, and as such, a skill, characteristic or human potential. A task in the visual languaging area has been to more fully understand the nature of visual languaging and to demonstrate and communicate its very existence as a "real" and significant language component. Beyond the existence and nature of visual languaging, however, a significant need and interest is expressed in appropriate and effective ways of how to, in fact, foster visual language development.

A common ground between viewpoints is found both in the fact that visual aptitude is a thread of common interest between the two, albeit for different reasons, and in various models which attempt to integrate the analysis of multiple factors related to learning, human development and instruction. If one considers ATI research as a beginning point to something, there appears to be an increasing trend toward consideration of more and more factors beyond aptitudes or traits and alternative instructional approaches. In the case of Merill (1975), the additional dimension seems primarily temporal. The point is well taken that it is mistaken to attempt to consider as relevant learner-difference factors only those which are (or are assumed to be) relatively stable or unchanging over time. Clark (1975), on the other hand, points out the need for a heirarchically constructed analysis of media attributes within a three dimensional matrix of subjects (or learners), behaviors (or learned outcomes), and media (or delivery system) attributes. Another approach (Ragan and Langenbach, 1974) involves production of N-dimensional matrices for analysis of multiple factor combinations for the purpose of generating questions. In each of these approaches, learner characteristics are a component.

The "learner characteristic" of visual aptitude may be considered as both an instructional design factor and as an output criterion or learning task. Visual literacy research and development can and should draw upon the multifactor analytic models and thinking which have become useful to instructional design researchers, and instructional design researchers can and should draw heavily upon recent work from visual literacy. Beyond the obvious and natural cross fertilization potential between the two sides of the visual aptitude coin explored in this symposium, the potential exists, perhaps, for programmatic research and development which cuts across this artificial dichotomy in formulating and approaching problems which are directed toward both concerns simultaneously and synergystically.

Abstract 7

A SOCIOLOGIST'S VIEW OF INSTRUCTIONAL TECHNOLOGY RESEARCH

Elizabeth G. Cohen
Professor
School of Education
Stanford Center for Research and Development in Teaching
Stanford University
Stanford, California 94305

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

The sociologist does not view instructional technology as necessarily involving any type of hardware. Technology is abstractly defined as the means by which organizational members carry out their tasks. In connection with the Environment for Teaching Program of the Stanford Center for Research and Development, a team of sociologists and educators has conceptualized two dimensions of technology relevant to elementary school instruction. One of these dimensions is the degree differentiation; the other is the character of teacher decision-making, running from routine to a highly reflective mode.

Theoretically, as the technology of the organization becomes more complex, the structure of the organization itself should respond by becoming more complex as well. We have been able to test out this proposition in a longitudinal survey of schools in the Bay Area. We find in data taken from teachers in 15 schools at two points in time that as the technology becomes more differentiated, i.e., individualization has become much more common, the practice of teaming has increased. Intili has also found relationships between interdependence of the teachers and the reflective character of the decision making concerning the teaching of reading.

The paper concludes with a discussion of the implications of this line of thinking for the conceptualization of optimal staffing patterns for man-machine systems in education. This analysis allows one to examine just what the effect of any innovation is on the technology of the classroom, on the management of student-feedback and on the demands on the larger system for coordination and administration.

A REVIEW OF RESEARCH ON RATE-CONTROLLED SPEECH AND ITS IMPLICATIONS FOR EDUCATION

Robert G. George, Symposium Moderator
Director of Educational Media
Indiana State University
Terre Haute, Indiana 47809

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

Purpose

The primary purpose of this study is to alert educators to the research that has been done, and that is currently going on, which could be translated into practical applications. A secondary purpose is to report on current and on-going research that has not been published in national journals as yet, but would be of interest to researchers currently involved in rate-controlled speech.

Rationale

There has been a real need expressed at several levels of education for a liaison between researcher and practitioner. There is a need for someone to glean, organize, synthesize, and ultimately disseminate a body of research in a consumable fashion for the practitioner in education. The field of educational research has been very demanding in the preciseness of its procedures and language. This very preciseness which is so necessary in research has served as a hinderance in the translation from theory to practice. This communication problem has been especially noticeable in the area of rate-controlled speech, as reflected by the low level of awareness on the part of educators.

Results

The early research conducted in the 1960's dealt with the very basics of what was then referred to as "compressed speech." The early studies of comprehension (Fairbanks; Foulke; Garvey; Harwood; *et. al.*), learning (Friedman; Foulke; Orr; Reid; *et. al.*), and retention (Foulke; George) laid the ground work for the feasibility of compressed speech.

The concept for using compressed speech in applied research has been and is currently being explored by various researchers in various fields. A partial listing of areas includes: Audio-Tutorial Instruction, Business, Counseling, Foreign Language, Medicine, Reading, Special Education, and Television and Film. There are obviously several sub-areas which have been studied, but the preceeding suggests some of the major areas.

The concept of expanded speech came into being in the 1970's. Limited research has been done in expanded speech, and most of these studies were done in special education. However, with the advent of expanded speech, the study of compressed speech and expanded speech became known as rate-controlled speech.

The latest development has been a technological breakthrough. Several new types of rate-control tape recording and playback devices have been invented which allow for immediate choice of rate of listening on the part of the listener. Not only are greater varieties of rates immediately available, but at prices below five hundred dollars for several brands. The lower costs are aimed at popularizing rate-controlled speech.

Conclusions

The feasibility of learning and retaining rate-controlled speech has been well documented. Further, learning takes place at all age levels beyond 6 years of age, and in all languages.

It has been demonstrated that rate-controlled speech crosses most disciplines with relative ease and effectiveness. There are, however, some disciplines that have not been explored in detail as yet.

Evidence is now emerging that suggests that other channels of communication are joining the audio channel in an effort to control rate of presentation in an effort to increase the efficiency of the

learner's time. Television is technologically the closest in its new video-audio compressor, Vidac, and potentially with the broadcasting of video on the FM bands as is done in the South Bend School System. Neither system, however, has been used in experimentation involving the rate of presentation factor.

Abstract 9

INSTRUCTIONAL EFFECTIVENESS OF SIMULATION TECHNOLOGY IN MEDICAL EDUCATION

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

Abdul Sajid
Coordinator Educational Systems
University of Illinois Medical Center
833 South Wood Street
Chicago, Illinois 60612

Michael Feinzimer
Assistant Professor in Medicine–Director Medical Education
Rockford School of Medicine
1601 Parkview
Rockford, Illinois 61101

James Magero
Director of Media Service
Rockford School of Medicine
Rockford, Illinois 61101

This study was aimed to determine whether a specific set of cardiac examination skills could be learned on an instructional electronic heart sound simulator by sophomore medical students independent of a medical instructor and clinical practice on human subjects. More importantly, the investigation focused on the question whether the skills acquired on a simulator were transferable to real patient examination. Furthermore, it was also explored whether the patients perceive the performance of students trained on a simulator differently from the conventionally trained students. The heart sound simulator was selected due to its extensive use in recognizing heart sounds at the University of Illinois and other institutions.

All of the sophomore medical class assigned to the Rockford School of Medicine, College of Medicine, University of Illinois, was randomly divided into two groups–experimental group A (simulator) and control group B (non-simulator). The group A received instruction on objectives related to the recognition of normal vs. abnormal heart sounds only from an instructional heart sound simulator. These students did not attend classroom lecture demonstration and were not allowed to practice in the clinic for listening to heart sounds on patients.

The group B learned the same objectives exclusively through the regular classroom instruction and clinical practice on human subjects. Two types of evaluative instruments were used to assess student performance related to the objectives selected for the study; (1) recognition of recorded heart sounds on the simulator (tape test) and (2) determination of actual heart sounds from six human subjects (patient examination test). In addition, the patients were asked to rate each student on a four item rating scale concerning the student's manner of handling the patient.

The performance of group A (simulator) on the tape recorded test was significantly higher than the group B (non-simulator at $P < .025$). The group A performed equally well when compared to group B on patient examination scores. The mean difference was only one point in favor of the simulator group. Thus, the learning of heart sounds from a simulator was as effective as learning on human subjects and from the instructor demonstration. Scores on the patient rating scale indicated that the patient held similar perceptions concerning competence, confidence, and patient manipulation for the simulator group as well as the non-simulator group. There was no correlation between student performance on patient exam and scores on patient rating scale in both groups. (Group A $r = -.06$, Group B $r = -.027$).

The students in the simulator group were asked to keep a log of their time on the simulator. The time ranged from 3.5 to 9 hours. There was no correlation between the amount of time spent on the simulator and the patient exam scores ($r = .44$).

The overall results seemed to confirm the hypothesis that skills learned on a heart sound simulator could be applied in examining human patients. Thus, the results helped to establish the instructional effectiveness of the simulation device. Also, the patients felt equally comfortable when examined by the students who were trained on simulator or on human subjects.

Abstract 10

VIDEOTAPED COMMITMENT: INFLUENCE ON SUBSEQUENT STUDENT ATTITUDE AND ACHIEVEMENT

Michael R. Simonson
Assistant Professor
321 Curtiss Hall
Instructional Resources Center
Iowa State University
Ames, Iowa 50011

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

Purpose and Rationale

Cognitive dissonance theory (Festinger, 1957) assumptions were used in an experimental situation to improve student attitudes toward a specific instructional activity. A test of student learning in the instructional activity was then administered to determine if an improvement in attitude would influence achievement.

Cognitive dissonance was produced in subjects by videotaping only positive subject opinions toward instructional activities. The videotape recorder was used not as a carrier of information, but rather as a powerful tool for the alteration of student attitudes toward instructional content, in order to observe whether attitude change could be used to improve achievement.

Procedures

A pre-test/post-test, control group design, with random assignment of students, was used to test hypotheses. The responses of 218 college students were collected at three times during the experiment. All measures (cognitive and attitudinal) had reliability estimates higher than .80 ($r > .80$). Analysis of variance and Scheffe tests were used to obtain 'F' statistics. An .05 level of significance was selected.

Results

The data collected were one of two types–attitude change or achievement. The results of the study demonstrated that it was possible to improve the attitude that a subject reported toward the instructional activity. Subjects who made a dissonance producing videotape, during which they described everything they anticipated as favorable or positive about the instructional activity, improved significantly in attitude toward the instructional activity over the short term ($p < .0001$), and over the long term ($p < .009$).

Achievement differences between treatment groups did not reach required levels of significance, but trends of mean group scores did support experimental hypotheses. It was found that subjects with below the median pre-attitudes toward the course, who had these attitudes improved when measured after treatment procedures, tended to achieve better than control subjects. Also, control subjects with above the median pre-attitudes toward the instructional activity were found to achieve significantly better than control subjects with below the median pre-attitudes ($p < .02$).

Conclusions

It was found that the attitude a learner expressed toward an instructional activity could be improved by applying cognitive dissonance theory procedures in a formal plan of attitude change involving the videotaping of subject positive opinions toward instructional content. These improved attitudes tended to persist after two months.

Achievement scores were not found to be significantly higher for learners who had their attitudes experimentally improved, even though trends of scores were supportive of hypotheses. However, learners who initially had more positive attitudes toward the instructional activity did achieve significantly better than learners with lower attitudes toward the course.

Abstract 11

TECHNOLOGY AND PSYCHOLOGY: EFFECTS OF MODELLING UPON VERBAL BEHAVIORS THROUGH BROADCAST ITV

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

Michael Szabo
Assistant Director
Pennsylvania State University
College of Education
CAI Laboratory
201 Chambers Building
University Park, Pennsylvania 16802

Dorothy Alfke
Professor of Science Education
Pennsylvania State University
College of Education
142 Chambers Building
University Park, Pennsylvania 16802

Robert L. Shrigley
Associate Professor of Science Education
Pennsylvania State University
College of Education
157 Chambers Building
University Park Pennsylvania 16802

Paul W. Welliver
Director
Pennsylvania State University
College of Education
Media Systems Research Laboratory
320 Rackley Building
University Park, Pennsylvania 16802

Objectives

A sophisticated and unique application of the powerful technology of instructional television was brought to bear on a pressing and persistent educational problem: curriculum dissemination. The Pennsylvania Department of Education developed an elementary science thrust called Science for the Seventies (SFTS) and then faced the problem of curriculum dissemination to a widely dispersed geographical population. The medium of instructional broadcast television (ITV) was coupled with a technique which returns control of the classroom to the teacher by making the teacher the prime determiner of the classroom operation. The major concern was the dissemination model which is described elsewhere. The present study examines a secondary goal related to the impact of the curriculum materials upon specific verbal behaviors occurring in classrooms using the materials.

Theoretical Framework

SFTS is not a curriculum, it is a thrust, a series of inquiry-oriented science lessons designed to improve the quality of science teaching in the elementary schools of Pennsylvania. ITV was selected as one test medium to disseminate SFTS curriculum information across the State. It was reasoned that curriculum acceptance by teachers would be significantly enhanced by structuring the programs to build in the teacher as the central component. The theory of enhancing locus of control in the teacher served as a key guideline. A field study evaluation of the SFTS/ITV Project indicated a substantial effect upon verbal behaviors and thus provided impetus for the present study.

Operationally, the central mechanism by which locus of control was transferred to teachers was through modelling or imitation theory of Bandura. Although most modelling research and dissemination efforts have been developed with young children, this project extended its use to adults (teachers). Selected teacher verbal behaviors are modelled through providing ITV programs which actively involve the teacher and students during the broadcast. During discussion pauses in the broadcast, the teacher practices (self-models) selected behaviors (e.g., question asking, accepting responses based on evidence) described in a handbook for teachers. Young models appear on camera and model: a) the decentralized role of the teacher in inquiry science teaching and b) selected manipulative skills useful in SFTS lessons.

Ten ITV programs have been developed to launch primary teachers and their students into ten correlated SFTS lessons: the intent is to encourage the teaching of science at the conclusion of the ITV broadcast. It was hypothesized that the modelling effect built into the ITV programs would significantly enhance teacher verbal behaviors deemed to be inquiry oriented or an a priori basis .

Data Source

A sample of 54 primary teachers agreed to use the SFTS materials in their classrooms. Ten teachers used only the ten SFTS lessons while the rest of the teachers used the same ten SFTS lessons and the correlated ITV programs with visual modelling. The field study was conducted during 1974 in two adjacent school districts in Central Pennsylvania.

The criterion variables consisted of verbal behaviors of teachers and students. Data were systematically and reliably coded by trained observers using the categorization instrument of Ribble and Schultz which contains eight categories of teacher behavior and four categories of student behavior. It was selected because it was judged to be the existing instrument most highly related and, therefore, sensitive to the six processes of teaching embedded in SFTS and the ITV modelling.

Results

The data analyzed consisted of verbal behaviors of classes of experimental teachers *during* the 15-minute interactive *ITV broadcasts*; verbal behaviors of the same teachers during the conduct of the correlated *SFTS lessons*; and verbal behaviors of the Control teachers' classes during the conduct of the *SFTS lessons* (no ITV modelling).

Significant differences were noted in the frequency of five teacher behaviors: agreement (sanctioning), initiation questions, information-giving, neutral-procedural, and directing; and one student behavior: volunteering. Each of these differences supported the notion of increased emphasis on inquiry oriented teaching.

When comparisons were made between data sets collected from the first and third groups above, five of the significantly different categories favored the ITV modelling group vis-a-vis the inquiry oriented teaching behaviors of agreement, initiation questions, information giving, neutral-procedural, and directing. Two categories favored anti-inquiry behaviors (examining questions and student volunteering). No significant differences for the remaining five categories were observed.

Educational Significance

The present field experiment and larger project has resulted in a promising approach to disseminating curriculum knowledge and instructional skills through the use of broadcast instructional television. The basic technique used in conjunction with broadcast ITV has been to transfer curriculum locus of control to the classroom teacher via written and video modelling activities.

Wise use of technology for appropriate outcomes using systematic analysis has resulted in a statewide demonstration of successful curriculum dissemination. The model is now being developed to serve curriculum development and dissemination efforts on a regional/national basis.

Abstract 12

THE EFFECTS OF AUDITORY CUES AND AUDITORY AND VISUAL CUES ON READING OF MUSICAL RHYTHMS

Muriel J. Bebeau
Arizona State University
College of Education
Box FLS
Tempe, Arizona 85281

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

Purpose

The purpose of this study was to determine the effect of requiring clapped (overt) rhythmic response together with auditory (overt) pulse response vs. audiovisual (overt) rhythmic response together with covert pulse response. The dependent variable was accuracy of young children's musical rhythm reading. This study is the first study of a series designed to determine effective instructional procedures for teaching music reading skill through use of audio tapes.

Rationale

Many music programs teach discrimination skills with cassette tapes. But music reading skills, especially rhythm reading skills, are very difficult to teach through audio tapes, since current methods of rhythm reading depend on acquisition of mathematical concepts which children generally have not mastered by the time rhythm reading training should be initiated. Since rhythm reading is a major source of error in music reading, music educators need instructional procedures and materials to teach this skill more effectively.

Procedures

Third grade children served as subjects in two experiments. Children were instructed in two separate groups in one of two ways. The Auditory group learned to apply note names and note values when reading rhythmic symbols. They were taught to maintain an auditory pulse response by counting aloud as they clapped rhythmic phrases. The Audiovisual trained group learned to simultaneously speak a word (audio) and make a movement (visual) in response to the note symbols, thereby making a speech and movement response (which included clapping) to the rhythmic phrase without maintaining an auditory pulse response. Twelve rhythmic concepts were presented in 4/4 meter to each group during the four weeks of training. Students were pretested and posttested on an investigator-prepared rhythm reading test which consisted of 23 rhythmic phrases containing the 12 rhythmic concepts taught during the treatment. Taped protocols were scored by a panel of music teachers.

The experimental design was a pretest-treatment-posttest design. In Experiment I children were matched on pretest scores and grade point average; the matched pairs were randomly assigned to treatments. Experiment II was a systematic replication of Experiment I with random assignment of pupils to the two treatment groups. In Experiment II, the teacher who taught both treatments had not previously used the Audiovisual method; she was given an hour's training in the method prior to the experiment. (See Figures 1 and 2 for a description of the two methods.)

Results

Independent and correlated tests were used to compare pretest and posttest scores. Both groups showed significant improvement in rhythm reading from pretest to posttest ($p < .01$). Comparison of the gains between treatment groups indicate that the Audiovisual treatment yielded significantly greater gains, significant at the .01 and .05 levels of confidence, for Experiments I and II respectively.

Conclusions

The implication of these studies is that systematic teaching of rhythm reading by either of the methods investigated can be beneficial for students at an early age. However, if the superiority of the Audiovisual method is demonstrated when applied to other meter bases, its use would enable young

children to read musical rhythm and engage in ensemble playing with noticeably less training than heretofore. Additionally, the Audiovisual method could be effectively taught by means of audio-taped, self-instructional programs, while the Auditory method could not.

Abstract 13

A DESCRIPTION OF A CONCEPTUAL MODEL OF INSTITUTIONAL RENEWAL

J. Steven Soulier
Instructional Development
Utah State University
Logan, Utah 84322

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

Institutional renewal, like many educational innovations, has outstripped its theory base leaving a condition where meaningful criteria for evaluation is lacking, and hypotheses for refinement and application of the concept are nearly non-existent. This paper deals with one institution's attempt to develop a conceptual model which is comprehensive enough to provide a description of a fuller process of institutional renewal.

The model is based on the strategies of planned change proposed by such people as Bennis, MacGregor, Owens, Likert, Havelock, etc., and on the assumption that the systematic interaction of all of the relevant parts of the institution will be more successful than a program based upon the haphazard or non-interaction of those components.

The model is eclectic, not dogmatic. No one particular educational technology principle or strategy of change was adopted, but each was placed in perspective and used as appropriate. The model was not designed to set policies or tell people what to do but to enable the faculty to perform their work.

A key assumption of the model is that renewal should strike at the basic unit of the institution. Originally, the model considered the instructor first, since it is he or she who controls the selection and presentation of learning cues to students; with the academic department considered second since they control the funds needed to bring institutional renewal about.

The Model–Stage I

The first step of the model was designed to create a *general awareness* concerning instructional innovations and potential improvement strategies. Relevant literature and seminars were provided for faculty members or academic departments, each devoted to a specific teaching approach.

Stage II

The second step of the model was that designed around *supporting* faculty initiative. The support stage, characterized by competitive grants and faculty consultation on instructional problems, is offered to all faculty members on campus.

For a modest grant of between $200 and $500 the faculty member invests his time in designing learning strategies resulting in the improvement of instruction.

Stage III

The third stage of this strategy is an *instructional development* stage. Here, the Division offers larger faculty grants enabling a faculty member or team to work about a year, designing, producing, and evaluating a project.

Stage IV

An extension of the third stage, this step includes working with entire departments. This stage allows the developer to work within the goals of a department and, as a consultant, act as a process person and referee, challenging as a sounding board the conceptualization of the content specialist.

Despite the lack of grandeur associated with the program as implemented, the process has won acceptance of the faculty and is making some limited in-roads to improving teaching and learning at a medium-sized university.

Abstract 14

FIVE YEARS OF INSTRUCTIONAL DEVELOPMENT: DESCRIPTION OF THE EVALUATION PROCESS

J. Nicholls Eastmond, Jr.
Instructional Development
Utah State University
Logan, Utah 84322

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

The role of a program evaluator is to furnish information for decision making and to provide justifying data. He is the project's "hired gunslinger," and his arsenal of weapons (all defensive) includes both descriptive, anecdotal-based, and outcome-oriented techniques. At each stage in the USU model a variety of evaluation techniques is employed.

Develop Awareness

Because the general level of awareness across campus towards the ID program was felt to be a prerequisite to the offering of services, a telephone survey of awareness was conducted during the project's fourth year. Findings indicated higher awareness than anticipated, among both faculty and administrators.

Faculty Support

ID support at this level is primarily mini-grants (up to $500) with minimal technical assistance for projects of the applicants' own choosing. Besides summarizing existing data, a mailed questionnaire gave useful information about work done to date and possible areas of refinement.

Faculty Development

Extensive involvement of faculty members on a released time basis characterizes this phase of the ID model. Evaluation efforts focus on process and product using a variety of techniques, from surveys of student opinion to standardized measures of achievement and from test item analysis to unobtrusive measures. The crucial element is faculty involvement in the design and implementation of any evaluation.

Departmental Involvement

A formal needs assessment conducted by the evaluator with the department helps in identifying the most critical areas for instructional development. In our work during the past two years with the departments of Civil Engineering and Wildlife Science, the accumulation of anecdotal information has helped us monitor progress of ID activities. Finally, an examination of costs and outcomes has provided an overall measure of project success.

Summary

In conclusion, there are some underlying beliefs that pervade the USU model for instructional development and evaluation. Our focus is primarily on ID activities for our own campus, since we believe that maximum impact can be had here. We involve faculty members extensively in the evaluation as well as the ID process, with the assurance that the investment of their own time and creative energy will result in the outcome being implemented. And finally, we look at the evaluator's techniques as a set of tools from which he can select those most appropriate and acceptable to faculty for each purpose.

Abstract 15

A REPORT OF THE FINDING OF AN EVALUATION OF AN INSTRUCTIONAL DEVELOPMENT CENTER

Michael DeBloois
Director of Instructional Development
Utah State University
Logan, Utah 84322

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

During the first five years of the Instructional Development Division, a particular model for operation has evolved which consists of four steps: (1) developing faculty awareness; (2) capitalizing upon faculty initiative, primarily through funding small-scale proposals written by the faculty; (3) conducting fairly substantial faculty support activities, involving an instructional development process; and (4) working with an entire department to revise departmental curricula.

A survey concluded that nearly 70% of the faculty members at Utah State University were *aware* of the program. Of the five different specific programs included under the awareness stage, the occasional paper was most successful. The mini-grant program, next; and release-time faculty development grants were noted third.

The second stage, that of support activities, was evaluated primarily through a questionnaire and personal interview. The questionnaire was sent to those 94 faculty members.

Forty-seven per cent of responding faculty indicated that they had *partially* fulfilled their objectives. Another forty-seven per cent indicated that they had *fully* fulfilled their objectives, and seven per cent reported lack of fulfillment. 81% of the respondents indicated that they were generally positive about the mini-grant program. Five per cent were generally negative, and fourteen per cent had mixed reactions. At the time of this writing, sixteen faculty development grants had been completed.

The faculty members receiving grants were well into their teaching careers. The program has primarily focused on the development of instructional products rather than the improvement of teaching skills. Participants almost never completed a project at the end of a faculty development funding—most finished within the year following. However, a few projects remain unfinished.

The fourth phase, working with entire departments for the improvement of departmental curricula, was only recently launched, and little empirical data presently exists to support that effort.

The Instructional Development Division has been moderately successful in achieving its goals. The faculty are generally aware of the opportunities for improvement. The modest attempts at creating faculty initiative have been generally successful. Through self-initiation faculty members can indeed improve their courses. Entire departments are able to assess their existing shortcomings through a needs assessment, and can launch major high-priority improvement efforts. Given adequate support, given the opportunity to initiate their own ideas and given an Instructional Development capability, universities can indeed become more self-renewing kinds of organizations.

Abstract 16

FACTOR ANALYSIS: A TOOL FOR INSTRUCTIONAL TECHNOLOGY RESEARCH

William Winn
Assistant Professor
Curriculum and Instruction
Faculty of Education
University of Calgary
Calgary, Alberta, Canada, T2N 1N4

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

Recent literature has criticized educational research for being too restricted. More representative and applicable research would not exclude proximal and distal variables from experiments (Snow, 1974), and would sacrifice statistical precision for the study of complex real-world situations (Stowe, 1973). These and similar pleas led Winn (1975) to describe the learner as a complex open system of many variables whose cognitive structure can only become apparent through multivariate analysis. Factor analysis is capable of analyzing such complex systems of variables.

Deese's (1962) technique of factor-analyzing the intersection coefficients of the distributions of free associations for all pair combinations of stimulus items in a conceptual domain provides an "access route" to cognitive structure. A link between the factor matrices obtained in this way and cognitive structure can be established by way of cognitive complexity theory (MacNeil, 1974; Scott, 1969). It is argued that factors correspond to dimensions of cognitive complexity, that the patterns and loadings of items on factors indicate relative positions of concepts on cognitive dimensions, and that inter-factor correlations indicate the degree of relationship between these dimensions.

In addition to this descriptive role, factor analysis has been developed to the point where it can be used for hypothesis testing (Mulaik, 1972) and for comparing experimental groups (Jöreskog, 1971). Completed and on-going studies illustrate how it can be used to advantage by educational technologists to study the effects of instructional treatments on cognitive structure and to compare instructional treatments. In both of these areas, multivariate environments and complex learners are assumed to be the objects of analysis.

Comparisons of "before treatment" and "after treatment" factor matrices, using Jöreskog's "Simultaneous factor analysis of several populations" procedure, allow detailed study of how various instructional treatments affect the dimensions of cognitive structure, their articulation, and the relationships between them. In addition, comparisons of matrices derived from free associations to concepts presented by different methods and taught by different treatments reveal how different methods and treatments affect cognitive structure in different ways.

The advantages of factor analysis as a research methodology for instructional technologists therefore lie in two areas: its ability to describe relationships between whole systems of variables; its ability to test hypotheses concerning structural, or qualitative, as opposed to purely quantitative, aspects of learning from different treatments.

Abstract 17

A FUNCTIONAL/EXPEPIENTIAL APPROACH TO CRITICISM OF MULTIMEDIA PROGRAMS

Ken Burke
Assistant Instructor
R-T-F Department
University of Texas
Austin, Texas 78712

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

Despite the wealth of "multimedia" entries in various education, art, and popular culture indices, there is little agreement on what constitutes multimedia or how it is to be properly used. In this paper, definitions are suggested for the multimedia field, then a method and a model of criticism are proposed for describing, analyzing, and judging multimedia programs. It is believed that this is the first systematic approach dealing directly with multimedia criticism. Further, the method is unique in that it focuses on critics such as teachers who must make immediate decisions regarding quality of the product.

Since the words "multimedia" and "criticism" have various connotations in different disciplines, some rationale must be offered for any use of the terms. "Multimedia" has been both an adjective and a noun, covering anything from general teaching situations to specific slide/tape presentations. To recognize this diversity, "multimedia" is used in this study as an adjective synonymous with "mixed media," thereby describing a wide range of teaching methods and communication channels, including film and television. A "multimedia program" is the specific mixed media combination of slides, audio tape, and related media in a self-contained presentation.

"Criticism" addresses the situation of the practical critic (the educator, art director, agency executive, or clergyman) who must make a spontaneous, but reasoned, response to a student, client, or employee producer of multimedia programs. Criticism of this type is rarely transcribed and published, yet the practical critic's authority to assign grades, salary, and agency approval gives him status which must be recognized and respected. His authority carries the responsibility of enhancing his critical abilities, hence the necessity of devising a methodology of immediate, qualitative criticism.

The model and evaluation instrument proceed from the premise that determining the function of a program will lead to a fair evaluation of the program. Further, this function must be determined from the standpoint of the critic's observation rather than from the view of the producer's intention. Five general communication functions are suggested, based on the writings of Harold Lasswell, Charles Wright, Wilbur Schramm, Edward Cavert, and Gerhard Wiebe; the five functions are information, instruction, persuasion, entertainment, and enrichment. Each of these functions has inherent characteristics which can be used to gauge the success of the program in question. The basic premise is that different types of programs serve different purposes, so the elements, techniques, and results proper to one function should not be used in judging another function. First, the program's function must be isolated and determined by examination of the dominant message. Then the constituent inclusions and devices of the program should be judged in regard to total effectiveness.

Functional observations should be done in as objective a manner as possible. Nevertheless, there is an important subjective element in the total situation of criticism. The critic's emotional responses in experiencing the program will form a mindset from which he will begin when trying to determine function and success. Realization and specification of these aroused emotions will guide the critic in recognizing biases and confusion which would hinder objective analysis. A last point about critical procedure is that most practical critics, such as clients and agency executives, will review the program in a private session with the producer well in advance of public showings. Teachers operate in semi-public critical capacity in grading classroom presentations.

A five-page evaluation instrument or a one-page condensed form will be used by the critic to note subjective reactions and objective descriptions of the program. Experiential reactions will be examined to safeguard against misdirected decisions on function. After recording and mentally re-evaluating responses to the program, the critic will be able to give a justifiable verbal reaction to the producer.

Abstract 18

A DELPHIC EXPLORATION OF THE FUTURE OF EDUCATIONAL MEDIA

Dean R. Spitzer
Assistant Professor
Educational Communications
ED119
State University of New York at Albany
1400 Washington Avenue
Albany, New York 12222

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

The purpose of this study was to investigate the appropriateness of the "Delphi Technique" to the study of future developments in educational media and technology. The study was also designed to yield substantive data concerning the most significant future developments in the field, as determined by a panel of experts, as well as indicate directions for futures research using the Delphi and similar techniques. This study is based on the perceived need for the development of valid and reliable techniques for futures forecasting. There has been a substantial controversy over the use of various techniques for forecasting and general doubt concerning their usefulness. This study aimed at responding to these and other questions.

This study employed procedures which are common to Delphi studies, although somewhat deviating from the original model. An open-ended questionnaire was sent to 200 potential respondents, selected by stratified random sampling from the AECT membership directory. Those contacted were asked to participate in the multi-round survey by first "nominating" trends in educational media and technology which they felt would be most significant in the next twenty-five years. Subsequent rounds of the survey were based on these initial nominations. One hundred questionnaires were returned and these respondents were considered to be part of the survey proper. Respondents were asked to indicate their predictions in terms of perceived "importance," "predicted increase," and "certainty of prediction" for each trend. This information was analyzed, and means and ranks were fed back to respondents. During the course of the survey, certain changes were made: items were consolidated to fifty-six in order to eliminate ambiguity and response categories were revised to "importance" and "probability of occurrence" due to respondent misunderstandings with the previously used terms. The survey consisted of four rounds. The process took more than six months to complete. Sixty-five respondents completed all four rounds.

The results of this study were not clear-cut. The results fell into two categories: the survey data and the indirect implications concerning the use of the Delphi technique. In terms of the survey data, the results are summarized on data tables distributed to conferees. Generalizations that can be derived from this data are the following: 1) There is a significant decrease in variance for most items between rounds, particularly between rounds two and three; 2) Some types of items seem to cause greater decreases in variance than others; 3) Many items changed their rank-position between rounds, some items moved considerably up or down the list; and 4) The most volatile items were "process" and "software" items, as opposed to "hardware" items. In terms of methodological implications, there were many. The principal problems were mortality, maintaining respondent enthusiasm over time, lack of feedback to respondents, unclear terms, ambiguous response categories, respondent selection, differential interpretation of items, lack of experience in futures-thinking, unpaid respondents, and communication problems between survey director and respondents.

It was concluded that many methodological weaknesses of the Delphi technique will have to be remedied before it will become a common tool of the educational technologist. The data-based findings are informative, but certainly not conclusive. Much more investigation of future trends in educational media and technology and the use of techniques like the Delphi should be forthcoming.

Abstract 19

A STUDY OF SELECTED FACTORS AFFECTING MEDIA-RELATED COMPETENCIES FOR TEACHERS, 1974-2000 A.D.

Billie Grace Herring
Associate Professor
Graduate School of Library Science
University of Texas at Austin
Box 7576, University Station
Austin, Texas 78712

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

Developments and changes which may be expected to occur in education from 1974 until after 2000, and which may affect the media-related competencies needed by teachers, were studied by use of the Delphi method. Data are descriptive and, because of the small size of the sample, are not analyzed statistically. Respondents whose opinions were sought included a nonstratified national sample of educators working in public and private schools, colleges and universities, professional societies, and governmental agencies. They represented elementary through higher education and seven areas of expertise. Questions were based on the findings of Farrell (1971) and the Texas Education Agency's *Study of Public School Instructional Resources* (1972).

Findings indicated that few changes were anticipated before 1980 but that 26 out of the 57 developments studied could be expected to be operational between 1981 and 1990. Nine developments were forecast for implementation between 1991 and 2000, and three were never expected to occur. Respondents anticipate that governance of education will not become centralized and that teachers will remain generalists who must have a broad range of skills. Increased emphasis on diagnostic and prescriptive activities by teachers and on accountability in terms of cost effectiveness were forecast. Use of support personnel was predicted, but respondents did not think that teachers' roles would become highly differentiated.

Respondents also indicated levels of desirability which they attached to each development. Most developments received moderately favorable to very favorable responses on the desirability scale.

Responses of both grassroots and expert respondents were analyzed in terms of sex, area of expertise, and level of education at which respondents work. No appreciable differences were determined between male and female respondents. It was found that respondents working at the grassroots level of education expected implementation of changes earlier than did expert respondents. They also thought that changes suggested by the items were more desirable than did experts. Respondents at the elementary level forecast implementation of developments earlier, agreed among themselves more, and found changes more desirable than any other group. Personnel in higher education were most pessimistic about when changes would occur. Television specialists expected changes earlier than other respondents. Little difference was found in the responses of librarians and media technologists. Persons working in curriculum, psychology, and teacher education were more pessimistic about implementation of study items and found the items less desirable. Results of the rounds of Delphi questioning were compared with two previous studies on media competencies for teachers, Stoops (1960) and Meierhenry (1966). The major difference between the Meierhenry study and this study was in the emphasis placed on various practices related to accountability and cost effectiveness of educational activities. The study concludes with the investigator's suggestions of media-related competencies that are implied by the answers of respondents.

Abstract 20

A COMPARISON OF REMEDIAL AND NON-REMEDIAL READERS ON SELECTED PERCEPTUAL STYLE VARIABLES

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

Lynna J. Ausburn
Graduate Associate for Instructional Development
University of Oklahoma
College of Education
820 Van Vleet Oval
Norman, Oklahoma 73069

Kathryn T. Back
Graduate Teaching Assistant
University of Oklahoma
College of Education
820 Van Vleet Oval
Norman, Oklahoma 73069

Barbara Hoover
Reading Teacher
Richard King High School
Gollihar Road
Corpus Christi, Texas 78412

This study was designed to investigate the differences in the performance of remedial and non-remedial readers on tests of perceptual style and perceptual tempo.

One approach to the amelioration of reading disabilities is to determine which special abilities may underlie reading behavior. This study represents an attempt to identify perceptual styles which are present in non-remedial readers at high school level, but absent in remedial readers at the same level.

Reading requires several basic perceptual skills, including the ability to separate and recognize individual words and the ability to perceive and systematically analyze differences among visual symbols.

Research in visual perception has revealed two perceptual variables which may be related to these skills. These perceptual variables are field independence/field dependence, which concerns the ability to perceive details as discrete from their backgrounds; and reflectivity/impulsivity, which concerns the speed and accuracy with which hypotheses are selected and information is processed.

Since reading requires the ability to separate and recognize individual words, field independence would seem to be desirable. It is therefore hypothesized that non-remedial readers possess a more field independent perceptual style, while remedial readers possess a more field dependent style.

The test for reflectivity/impulsivity requires the ability to perceive differences in visual stimuli and to analyze them systematically without recourse to impulsive selection of a solution. This ability appears to be related to a basic perceptual skill necessary for reading. It is therefore hypothesized that non-remedial readers possess a more reflective tempo, while remedial readers possess a more impulsive tempo.

Forty high school students between the ages of 15 and 17 identified with the *Reading for Understanding Placement Test* as being at or above their respective grade level in silent reading comprehension, and 40 students identified as being below their respective grade level were selected. All were administered the *Hidden Figures Test* and *Matching Familiar Figures*. Differences in performance of the non-remedial groups were compared on the three variables of score on HFT, errors on MFF, and mean latency on MFF with three separate one-way ANOVA's. Subjects were then classified as field independent, field dependent, reflective, and impulsive where possible. Chi-square tests were computed to test the differences between expected and obtained frequencies of each of these groups within the remedial and

non-remedial groups. A step-wise discriminant analysis was performed to see if the three variables could predict the categories of remedial and non-remedial readers.

The ANOVA's showed that the differences between remedial and non-remedial groups on score on HFT ($F=9.491$, $df=1,79$, $p=.003$), errors on MFF ($F=5.482$, $df=1,79$, $p=.02$), and mean latency on MFF ($F=13.534$, $df=1,79$, $p=.001$) were all significant. The chi-square tests showed no difference between expected and observed frequencies of field independents ($X^2=1.82$, $df=1$, $.20>p>.10$) or reflectives ($X^2=1.50$, $df=1$, $.30>p>.20$) in the remedial and non-remedial groups, but a significant difference in the expected and observed frequencies of field dependents ($X^2=3.846$, $df=1$, $p=.05$) and impulsives ($X^2=7.54$, $df=1$, $p<.01$). The discriminant analysis showed that the three predictors used could significantly discriminate between remedial and non-remedial readers ($F=7.29$, $df=3,76$, $p<.001$), with 70% accuracy.

The following conclusions were drawn:

1. Remedial and non-remedial readers perform differently on HFT. Non-remedials make higher scores, showing a greater degree of field independence.

2. Remedial and non-remedial readers perform differently on MFF. Non-remedials make fewer errors and take longer time, showing a greater degree of reflectivity.

3. Remedial readers have a greater proportion of field dependents and impulsives than non-remedials.

4. Score on HFT, errors on MFF, and latency on MFF predict remedial and non-remedial reader classification with significant accuracy.

Abstract 21

PREFERENCE FOR VISUAL, AURAL, OR AUDIO-VISUAL TREATMENT IN TEN EDUCATIONAL SETTINGS AS A VARIABLE IN ATI RESEARCH

Susan Ruotsala Storm
Graduate Assistant
W13B East Hall
Educational Media
University of Iowa
Iowa City, Iowa 52242

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

One hundred sixty-eight pre- and in-service teachers at the University of Iowa were tested for modality preference (visual, aural, or both) using an instrument consisting of ten vignettes, each with three treatment alternatives, to be preferentially rank-ordered. Relationships between those S_s, categorized as visual, aural, audio-visual, or flexible by preference to other variables (major area, sex, program level and previous or current teaching experience), were tested using a frequency chi-square statistic. The main effect demonstrated the overwhelming preference of teachers for audio-visual solutions to instructional problems. It is posited that certain matches between teacher solution preference (treatment style choice) and pupil style tend to facilitate learning.

Abstract 22

INTERACTIVE EFFECTS OF COLOR REALISM AND LEARNER I.Q. ON VISUALIZED INSTRUCTION

Louis H. Berry
Assistant Professor of Education
Program in Educational Communications and Technology
103 LIS Building
University of Pittsburgh
135 N. Bellefield Avenue
Pittsburgh, Pennsylvania 15260

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

Purpose

The purpose of this study was to determine the relative instructional effectiveness of two forms of color-cued visual instructional materials in facilitating achievement of students who possess different I.Q. levels. Both immediate and delayed retention effects were examined.

Rationale

An ongoing controversy exists with regard to the role of realism in visual materials. One theoretical orientation suggests that the more realistic an instructional device, the more effectively it will facilitate instruction. A conflicting group of theorists describe the human information processing system as being of limited capacity; which, in times of high information input may become overloaded and possibly block a portion of the information.

In studies related to the use of color in visual materials, similar conflicting results have been reported. As a result, few guidelines have been forthcoming relative to the use of color in visualized material for instruction. Consequently, selection and utilization are determined primarily by two, non-instructional factors: the greater aesthetic appeal of color and the relatively higher production cost of color materials. The need to explore the relationship between learner's mental abilities and the types of color visuals most effective in facilitating achievement is of particular importance to the formulation of such guidelines.

The primary objective of this study was to investigate the interaction between (1) different types of color cueing techniques (color realism) and (2) an individual difference variable (I.Q.) as evidenced by scores on five tests of learner achievement.

Procedure

The materials used in this investigation consisted of six instructional programs on the parts and functions of the human heart, presented by means of audio tape and slides. Each of these programs contained a series of visuals intended to complement the same oral script. Two sets of visuals were prepared in realistic color and two sets were produced in non-realistic color by means of photographic reversal. The remaining two sets were prepared in black and white and non-illustrated formats, respectively. Photographic reversal was used as a means of producing visual materials in which the total number of visual cues was held constant while the color of the visual could be modified.

Data for this study were obtained from 224 undergraduate college students. Subjects were pretested with a standardized mental ability test and a general test in the content area. S's were assigned to one of six treatment groups. These groups represented (1) non-illustrated; (2) black and white shaded drawings; (3&5) realistic color drawings; (4&6) non-realistic color drawings.

Measurement of achievement was accomplished by the use of five tests designed to measure achievement of different educational objectives. Achievement tests were administered both immediately following instruction and at a time six weeks later.

Statistical analysis was conducted by the use of analysis of co-variance procedures. When significant F-values ($p<.05$) were found, the Scheffe test was used on all pair-wise comparisons.

Results

Of the ten F-ratios computed, two interactions were significant at the $p<.05$ level. In cases where the interactions were not significant, seven main effects were found to be significant—4 at the $p<.05$ level and 3 at the $p<.01$ level. Six of the significant F-ratios occurred in the immediate posttests and three occurred in the delayed posttest.

Conclusions

In immediate and delayed posttests where a significant interaction was found, it must be concluded that the effect of different types of color cued visuals is not the same for students who differ in their level of I.Q.

It can also be concluded that non-realistic color cued visuals appear to differentially reduce the amount of information lost by students in different I.Q. levels.

Based on the findings reported, it would appear that the choice of color cueing techniques is an important factor to be considered in producing visual instructional materials for students of different ability levels.

Abstract 23

GRADUATE EDUCATION IN INSTRUCTIONAL SYSTEMS

Keith A. Hall, Symposium Moderator
Professor
The Pennsylvania State University
201 Chambers Building
University Park, Pennsylvania 16802

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

Considerable work has been done in a variety of locations in changing the characteristics of graduate programs from the traditional classroom experiences and thesis-writing to more comprehensive educational programs oriented toward preparing graduates for positions where accountability has become a key element. The focus of the symposium would be on a dialogue and exchange of ideas related to the topic.

There is emerging an increasing recognition that applied science is not a step-child of natural science. In fact, in the social science sphere it may be that as we define more appropriate methodology and theory relevant to applied science, we may be defining that which is unique and powerful about social science. The proposed symposium can address this issue in our area and hopefully stimulate heuristic thinking.

Not only does the curriculum issue have potential importance, but the instructional methodology issue also bears on the ubiquitous instructional problem of creating a truly effective instruction relationship in a dyadic or small group environment that characterizes a very significant portion of all education. We know very little about this most expensive approach to instruction.

Harvey Black's presentation "Instructional Science-Based Prescriptions for Preparing Instructional Scientists" will provide an overall but detailed view of a needed but non-existent graduate program for preparing instructional systems scientist-technologists. His presentation will include specification for curriculum elements (competencies), competency acquisition, and assessment procedures. Other presentations will present detailed and divergent viewpoints of elements of a graduate education in instructional systems—Richard Clark, "A Clinical Model for Graduate Education in Instructional Systems," Thomas Schwen, "Curriculum Elements of Graduate Education: A Brief Case Study on the Evaluation of a Doctoral Program," and Robert Tennyson, "Evaluation: Its Role in Instructional Development."

Abstract 24

A CLINICAL MODEL FOR GRADUATE EDUCATION

Richard E. Clark
Syracuse University
School of Education
Area of Instructional Technology
Syracuse, New York 13210

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

Graduate programs in education have often assumed that they must train *either* practitioners or researchers. This assumption has led to struggles between factions in schools of education that associate themselves with one point of view or the other. These pressures are clearly evident in the larger institutional technology graduate programs.

This paper makes the assumption that it is misleading and eventually destructive of educational programs to require that they either be directed toward the training of practitioners or researchers. It is suggested that the field of instructional technology has a special need to avoid this dilemma in favor of the training of 'inquirers' who may choose to work in a variety of settings. There is a brief discussion of inquiry skills and their relationship to needs in our field.

It is strongly suggested that a clinical model may meet training requirements for graduate students who will be working in instructional technology over the next few years. A number of approaches to clinical training in instructional technology are discussed along with the possible implications for changes in existing graduate programs. A brief case study of the growth of such a program at Syracuse University will be described.

Abstract 25

CURRICULUM ELEMENTS OF GRADUATE EDUCATION: A BRIEF CASE STUDY ON THE EVALUATION OF A DOCTORAL PROGRAM

Thomas M. Schwen
Director
Division of Development and Special Projects
Indiana University
Audio-Visual Center
Bloomington, Indiana 47401

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

The case study deals with the methodology employed in evaluating Indiana University's Division of Instructional Systems Technology (DIST). The review, although still in progress, has been compiled in a rough draft form. The DIST is one of five administrative units in the School of Education at Indiana University. The Division, in conjunction with the graduate faculty, offers both the Ph.D. and Ed.D. Students may specialize in semiformal 'emphasis areas': Message Design (production); Instructional Development; Diffusion and Adoption of Educational Innovations; and Administration of Learning Resources Programs. The students may elect other thematic specializations (e.g., research) or any combination or permutation of the above in building an individual program.

The program is served by twenty-three professionals (doctoral level). These faculty all serve the Institution with joint appointments in either the A-V Center or other academic units in the School of Education. Approximately one hundred doctoral level students are in residence at any one time and the modal figure for degrees awarded has been 17 in recent years.

The scope and form of the evaluation was substantially influenced by a school-wide effort to evaluate all doctoral programs. The Graduate faculty have wrestled with quality control in doctoral programs for a number of years. The impetus for the reviews came from a number of committee and individual position papers in the year preceding the reviews.

The case describes the ten criteria and types of evidence collected in regard to:
(1) integrity or wholeness; (2) competency based instruction linked to multiple curricular experiences; (3) degree of individualization; (4) recruitment and selection procedures;
(5) theory-practice integration; (6) sophistication and rigor; (7) inquiry orientation;
(8) quality of faculty; (9) adequacy of facilities, equipment, and other resources;
(10) provision for self renewal.

The case reviews pragmatic and theoretical problems in implementing the review. It, also, speaks to the prognosis for this form of review in the School of Education.

Abstract 26

ALTERNATIVE FORMS AND FUNCTIONS OF THE DISSERTATION

Robert D. Tennyson
Associate Professor
117 Burton Hall
Instructional Systems
University of Minnesota
Minneapolis, Minnesota 55455

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

The purpose of a doctoral dissertation in instructional systems does not differ substantially from other areas of study in education. That is, the thesis serves as a major method of assessing the students ability to make scientific contributions to his/her field of inquiry. Course work in a doctoral program of study is a convenient method to obtain the basic skills necessary to be knowledgeable in that general field. However, the acquisition of the competencies for the doctorate requires experiences beyond the related, conventional classroom and laboratory experiences. A usual non-instructional method of acquiring job related competencies consistent with doctoral level standards is the internship work. But, the dissertation activity, which in many areas of instructional systems should provide another experience directly related to post-graduate job experiences, is too often limited to the typical laboratory style experimental research topics and methods found in educational/psychology dissertation. Certainly, this type of laboratory research has a place in instructional psychology, but for most areas of instructional systems (e.g., development, technology, evaluation, and management) I am proposing that the alternative form of field-based research is a more desirable form of dissertation research. The questions and problems associated with the learning environment can only be studied by research projects that take place in that environment—away from the artificial setting of the laboratory.

Field-based research is of course not a new or even novel form of study in education. Unfortunately, though, the term has a negative connotation in experimental research areas because of the simple questions (usually the independent variables are too general and not operationally defined) investigated and because of a lack of rigor in applying scientific methodology to the study. I am of the opinion that the criticisms are justified, and for the most part the result of such research has had little or no impact on education. The examples of field-based research where scientific methodology has been applied does demonstrate the feasibility and desirability of including that research method as an alternative (and, as a first choice) form for the instructional systems dissertation.

Abstract 27

INSTRUCTIONAL SCIENCE–BASED PRESCRIPTIONS FOR PREPARING INSTRUCTIONAL SCIENTISTS

Harvey B. Black
Instructional Science Department Chairman
W160D STAD
Brigham Young University
Provo, Utah 84602

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

Instructional Science graduate program guidelines

No unsupported claims of instructional effectiveness. Neither substantive or theoretical program content, nor program products created by either faculty or students, should be represented as being more instructionally valid than is indicated by scientific inquiry procedure. Instructional theory and prototype products should be subjected to aggressive programs of scientific inquiry aimed at their improved effectiveness.

Applied Social Science graduate program guidelines

No destructive separation of the symbiotic scientist and professional roles of the applied social scientist. Scientist and professional roles differ with respect to clients and products but both depend upon the same inquiry and design methodologies and the same substantive information bases. The object of their inquiry and design is the design process of the learner, the teacher and the instructional designer which both attempt to explain, predict and control. The graduate program must encourage symbiosis and not counterproductive differentiation.

Social Science graduate program guidelines

No assumptions of a substantive natural science content in the social sciences. The substantive content is inquiry and design methodology and not general laws of social behavior. The cumulative knowledge of social science in general is not universally generalizable natural laws. The laws of social science prove repeatedly to be highly content specific. The intellectual substance of social sciences is the growing inquiry methodology designed to aid in decision making in the realm of contextual laws as is illustrated in management science, information science and design science.

General Graduate program guidelines (based upon the general assumption of no longitudinal transfer of learning with the implication that optimal graduate programs resemble in detail scientific and professional programs of the real world.)

No Parochial Inbreeding of Student and Faculty–The student must be prepared to deal with diverse values, views and orientations. Recruiting students and faculty with only a narrow party line approach is seriously debilitating to students who must react to real world diversity.

No Role Distinction Between Student and Faculty–Although responsibilities differ initially, every effort must be made to achieve genuine colleaguial equality. This naturally leads to avoidance of all student exploitation strategies including unrecognized joint authorship, unpaid professional assistance, delayed advancement in pay and rank, etc. for the personal benefit of the professor.

No Non-product Oriented Effort–Whether due to program design, financial stress, lack of self-discipline or competing for both faculty and students. When professional efforts through internship, advanced project and individually initiated efforts are professionally, personally and financially rewarding the competing activities dry up as they should and must.

No Traditional Dissertation–The dissertation should be a client ready product to be sent to a publisher or sophisticated and demanding client of professional services and not a futile exercise destined for a dusty corner of the library which defies attempts to access, disseminate or utilize it.

No Traditional Examinations–Demonstration of qualification for professional/scholarly roles is not by traditional qualifying examination but by presenting evidence of scholarly research, professional performance as judged by critical clients.

No Content Heirarchy–Although some concepts, principles, organizing schemes or conceptual representations may be more central, generative or readily related to others, the available evidence suggests that starting with a task of practical interest rather than on some conventional book one or page one is most effective. Eventually an idiosyncratically valid network of knowledge will become established.

No Traditional Prerequisites–Professionals observe no defined set of steps in problem solving–when they identify a gap in knowledge they search for the missing knowledge. Prerequisites are more likely to be confidence in solving problems and managing resources than formal courses.

No Traditional Courses–Professionals/Scholars search, examine, analyze, and persuade colleagues but do not passively sit through lectures, cram for exams and omit study of untested material.

Abstract 28

AN INSTRUCTIONAL SYSTEMS APPROACH FOR THE TEACHING OF UNDERGRADUATE BIOLOGY AT KANSAS STATE UNIVERSITY

John W. Eads
Instructor
Division of Biology
Kansas State University
Manhattan, Kansas 66506

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

The purpose of this presentation will be to describe and illustrate the re-organization now in progress at Kansas State University, where a significant break from traditional instructional design is underway. The somewhat unique situation the midwestern land grant institution finds itself in, with respect to an extremely diverse student population in its introductory course offerings, has prompted efforts to develop an entire spectrum of offerings which utilize the strengths of various forms of instructional approaches.

The heterogeneity exhibited by students in all aspects of their makeup, along with a desire to accomodate transfer students and the so-called "non-traditional learner," while increasing the exportability of campus course offerings, necessitates modifying not only the learning environment, but also the mode, style, and level of presentation. If the student can indeed be recognized as a unique entity, each with special needs and aspirations, and if learning experiences can be designed to take into account all of his unique qualities, high quality, large group instruction will more often be realized.

By taking the small nucleus of faculty with experience in the design and implementation of instructional systems, and combining that with (1) the large quantity of subject matter expertise in a university faculty and (2) the known strengths of such methods as Postlethwait's Audio-Tutorial approach, Keller's PSI, and the work of such scholars as Piaget, an instructional system can be designed to meet previously identified student needs and instructional shortcomings. Ideally, the system will resemble in many respects the model proposed by Fraley and Vargas, with content matters being the responsibility of one aspect of the instructional team, and control of the learning environment and the designing of specific student learning experiences being the responsibility of other, more qualified members of the instructional team.

Only preliminary results are available at this time, and those are from individual, separate courses which have been experimenting with various aspects of the approaches to be used in the system. However, they indicate strong student approval of the methods, a commitment on the part of the entire faculty to become involved in system development, and from past faculty experiences and research conducted both at Kansas State and elsewhere, provide a sound basis for planned undertaking.

As stated above, results and their subsequent conclusions are still being arrived at. However, it has been concluded by those involved that in order to take into account the extremely diverse student population encountered in undergraduate course offerings, and to more effectively approach a truly high quality instructional setting, a multi-sensory, self-paced, multi-track, modular form of presentation must be adopted. Incorporated into this system will be mastery learning, variable credit options, and diagnostic instruments to determine the student's level of sophistication both at entry into and exit from a module sequence. The system for biology will hopefully lead eventually to an interdisciplinary systems approach for undergraduate instruction.

Abstract 29

THE DESIGN, DEVELOPMENT, IMPLEMENTATION, AND EVALUATION OF A COLLEGE LEVEL INTRODUCTORY BIOLOGY PROGRAM FOR MAJORS AND NON-MAJORS, INDIVIDUALIZED FOR STUDENT RATE, METHOD OF INSTRUCTION AND STUDENT GOALS

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

John W. LaTrielle
Instructional Development Specialist
Weber State College
Instructional Development
3750 Harrison Boulevard
Ogden, Utah 84408

During the past 20 years considerable attention has been focused on the possibility of offering a college level biology course that would meet the needs of both majors and non-majors. Many professional biologists and science educators have moved from a position of one course for majors and non-majors at the expense of the non-majors to a position of one course for majors and another for non-majors. In recent years, however, there has been a trend to offer one course comprised of many modules to satisfy the needs of both majors and non-majors. The purpose of this study was to design, develop, implement, and evaluate such a course.

Course Design

The design of the course was based on a matrix that utilized eight biological themes to delineate the vertical axis and eight biological levels of organization to delineate the horizontal axis. The resulting matrix contained 64 cells and within each cell between one and twelve modules were developed during the development phase. By using a matrix design the potential for orderly growth is always present.

Course Development

The development phase of the program involved writing a total of 109 biology modules that were placed within the 64 cells of the matrix. In order to implement the course philosophy, which stated that the course should move toward meeting each individual's needs, the following concepts were implemented: Mastery learning, individualized rate of learning, instructional methods, learner goals, the use of performance objectives, the engaging of the student in learning behaviors which include all of the levels within Bloom's taxonomy, student control over learning, criterion-referenced testing, feedback evaluation, a student-centered course rather than a professor-centered course, the engaging of biology majors in learning experiences different from those of non-majors, the removing of systematic failure and the designing of a course intended to influence student attitudes.

Course Implementation

The course was implemented during fall and spring terms, 74-75, at the University of Wyoming as Introductory Biology 301F&G. Seventy-five individuals were selected to proceed through the experimental course as the remainder of the class proceeded through the regular individualized course. The modules that each student selected were determined by the student in order to meet his individual needs. Grading for the course was based on a quantitative judgment rather than qualitative judgment, being that all students had to achieve mastery on any one module before proceeding.

Course Evaluation

Data was collected to determine the degree to which the course was individualized for rate, mode and goal. In addition the students were given a science attitude test as a pre- and posttest to determine if the course had a significantly positive effect on student attitude toward science.

Abstract 30

BLUNDERS COMMONLY FOUND IN STUDIES OF THE COST OF INSTRUCTIONAL TECHNOLOGY

Donald D. Rogers
Senior Associate
RMC Research Corporation
7910 Woodmont Avenue
Bethesda, Maryland 20014

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

As the accountability movement gained momentum during the late 1960's and the early 1970's, an increasing amount of attention began to be paid to the manner in which the resources available to public educational institutions were being used to achieve the goals of these institutions. Perhaps because of its visibility or perhaps because of its apparent high cost, instructional technology received particular attention. Reports such as the Commission on Instructional Technology's *To Improve Learning* and the Ford Foundation's *An Inquiry Into the Uses of Instructional Technology* not only documented the lack of the cost data necessary for making decisions about the cost-effectiveness of using various instructional technologies but also demanded that such information be obtained.

Within the last few years the results of studies designed to provide this demanded information have begun to be reported. Unfortunately, many of these studies contain serious methodological flaws and have, therefore, produced results and conclusions that have little or no reliability and validity. Nevertheless, the results and conclusions of these studies may and probably do serve as a basis for decisions being made by administrators who do not take the time necessary to judge the quality of these studies. Because the results of these studies frequently indicate that the application of instructional technology is inefficient and/or ineffective, decisions based on unreliable, invalid information have a real potential for seriously damaging the field of instructional technology.

The purpose of this paper is to present and discuss the most serious methodological errors that are commonly found in studies attempting to examine the cost and/or cost-effectiveness of instructional technology. Three studies will be used to provide a basis for discussing these errors. Because of the diverse nature of the activities which are considered to be part of the field of instructional technology, the three sample studies have been selected not only because they readily reveal the errors which occur but also because they reflect the range of the application of technology. One example is a study of computer-managed, basal, elementary curriculum used in 31 classrooms in four schools of a midwestern school system. The second example is a study of the relationships between educational achievement and employed educational resources in 63 school districts in an eastern state. The final example is a study that determines the cost of implementing 20 different kindergarten through third grade curricula and employs a sample of approximately eight schools for each curriculum.

The focus of the paper will be on the four most common and most serious errors. Two may be characterized as simple blunders that are readily apparent. The other two are readily apparent to individuals with a minor amount of accounting and statistical skills. These errors may be characterized as the failure to determine what is being analyzed, the failure to include all costs, the failure to obtain comparable cost data, and the failure to use an appropriate statistical analysis. These errors are primarily related to the cost considerations associated with a cost-effectiveness analysis. The problems and errors associated with measuring effectiveness will be mentioned when appropriate but will not be emphasized.

The intended audience for this paper consists of both the administrators who make decisions based on costing studies and the instructional technologists who may be adversely affected by these decisions. In addition, this paper is intended for those who are performing or are interested in performing costing studies.

THE ROLE OF CONTEXT IN RECOGNITION MEMORY FOR PICTORIAL MATERIALS

Jerry D. Sparks
Assistant Professor of Educational Media
607 Aderhold Hall
University of Georgia
Athens, Georgia 30602

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

Purpose

The main purpose of this study was to determine whether or not the presence of pictorial context affects recognition memory for pictorial material. The two main stimulus types were: (1) pictures with a single primary stimulus and (2) pictures with a primary stimulus surrounded by contextual stimuli. Drawings by three artists provided an additional variable to determine the effect of artistic rendering on recognition memory for pictorial material.

Rationale

Various contextual factors can influence performance on many tasks. Media personnel involved in design and selection activities should be concerned with how contextual elements influence learners' performance.

A matrix displaying the interactions of context types, pictorial types, and memory types enabled the identification of 128 cells involving contextual factors in memory for pictorial materials. Further examination of the matrix and related research led to the selection of the independent variables used in the study.

Procedures

To determine the effect of context on memory for pictorial materials, subjects viewed a controlled rate presentation of outline drawings consisting of two distinct stimulus types. One hundred and nineteen college students participated in the experiment. The major stimulus variable was the presence or absence of contextual elements. In a set of 90 specially prepared drawings, one-half of the illustrations consisted of a centrally located primary element with surrounding contextual elements (PC stimuli). The other 45 drawings contained only a primary element (PA stimuli). The collection contained one and only one drawing to represent each of 90 nouns on a select list. Each drawing was viewed for two seconds. Multiple choice recognition tasks presented one week after initial viewing yielded multiple scores for each subject. Repeated measures technique allowed subjects to serve as their own control. The means of PA (primary stimulus alone) and PC (primary stimulus with context) scores were compared by analysis of variance to determine the effect of context on recognition memory.

The effect of different artists' renditions on recognition memory for outline drawings was also examined. Three artists were presented in the same set of 90 drawings. Within the subset of 45 drawings prepared for each contextual type (PA or PC), there were 15 drawings by each artist. The means of recognition scores for outline drawings by various artists were compared by analysis of variance to determine the effect of different artistic renderings on recognition memory.

Analysis of variance was also used to determine the effect on recognition memory when both stimulus type and artistic renderings were varied.

Results

The major findings of this study were as follows:

1. Recognition memory for outline drawings consisting of primary stimulus with surrounding contextual elements was clearly superior to recognition memory for outline drawings without contextual elements.

2. In recognition memory for outline drawings, various artistic renditions have a differential influence on subject's performance.

3. The effectiveness of a particular artist's renderings of outline drawings is consistent (in relation to other artists' renderings) across context types (PA and PC).

Conclusions

The major conclusions of this study were as follows:

1. Contextual elements facilitate recognition memory for pictorial materials.

2. Different artistic renderings are a factor in the effectiveness of an illustrated message.

3. Artistic renderings which yield the highest recognition memory scores in any one context type (PA or PC) will yield the highest recognition memory scores in the other context type.

Abstract 34

THE INFLUENCE OF CONTEXTUAL STIMULI ON TEST PERFORMANCE OF COLLEGE STUDENTS

Alan D. Todd
Teaching Associate
College of Education
The University of Oklahoma
820 Van Vleet Oval
Norman, Oklahoma 73069

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

This study was conducted to determine if a change in location from presentation of material to application of the material in a testing situation effects a student's score on a teacher-made achievement test. The material was presented to all subjects via audio tape-filmstrip segments in an independent study laboratory. No effort was made to limit time spent by the subjects studying the material.

Subjects were randomly assigned to one of two groups for testing to determine the influence of locational contextual stimuli. The control group took the examination in the laboratory where the material was presented, and the experimental group took the examination in a room unfamiliar to the subjects. The same instructor was present in both testing situations.

The dependent variable was the raw score obtained on the examination. An analysis of variance (ANOVA) indicated that the control group achieved a significantly higher score on the examination than the experimental group.

Abstract

EVALUATION: ITS ROLE IN INSTRUCTIONAL DEVELOPMENT

Robert D. Tennyson
Associate Professor
117 Burton Hall
University of Minnesota
Minneapolis, Minnesota 55455

As Prepared
for the Research Paper Presentations
at the 1976 AECT Convention
in Anaheim in March
and Reproduced for Distribution
by the ERIC Clearinghouse
on Information Resources
Stanford University
Stanford, California 94305

Conventional instructional development models are composed of sequential steps which lead to the production of instructional materials. The steps of instructional development most often include these phases: identification of goals and objectives, design of instruction materials, development and production, and evaluation. The rationale often used for placing evaluation last in the development process is that it provides a method for revising the instructional product prior to dissemination. However, evaluation of the materials at that point can be too late for cost-effective product revisions because the repetitive recycling loop comes when the product is basically ready for dissemination. Thus there is a need for an instructional development model that provides for evaluation of the feasibility of the project, evaluation during the formative design and development phases, summative evaluation prior to dissemination and provides continued evaluation after implementation. The purpose of this paper is to present instructional materials evaluation guidelines that eliminate the assumption of a recycling evaluation system in instructional development.

Evaluation of instructional materials involves four basic interactive phases: feasibility, formative, summative, and maintenance. In the first phase, feasibility, the appropriateness of the procedure used to analyze the instructional need and development capabilities is evaluated, while in the second–formative, the instructional materials are evaluated at various points during the design and development phases for purposes of revisions and refinements. When the instructional materials have been developed, evaluation in the summative phase determines the extent to which the materials adequately enable the learner to effectively and efficiently perform the behaviors being taught. In the final phase, maintenance, the instructional materials are evaluated for purposes of adoption and/or modification, and after implementation, evaluates the instructional materials for possible continuing use.